

REMARKS

Claims 1-20 are pending. Claims 1-20 have been rejected. In particular, claims 1-3, 6-9, 11, 17, and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang, and claims 4, 5, 10, 12-16, 19, and 20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang and further in view of Foley. Claims 1, 11, and 18 have been amended. No new matter has been added.

Rejection of claims 1-3, 6-9, 11, 17, and 18 under 35 U.S.C. § 103(a)

Claims 1-3, 6-9, 11, 17, and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over King in view of Wang. It is respectfully submitted that claims 1-3, 6-9, 11, 17, and 18 are patentable for the reasons set forth below.

Claims 1-3, 6-9, 11, 17, and 18 include features that are neither disclosed nor suggested by the cited references, taken alone or in combination, namely, as represented by claim 1:

A dual mode device for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product component or a dot product in response to a first signal, the first signal indicating whether to generate a cross product component or a dot product; and

a dual mode unit coupled to receive the selected vector components for generating the cross product component or the dot product in response to the first signal and comprising a plurality of shared logic units that are used to generate the cross product component and the dot product. (emphasis added)

The present invention, as embodied in claim 1, is directed to a dual mode device for generating vector cross products and dot products. The dual mode device comprises a dual mode unit that generates a cross product or a dot product in response to a signal. The dual mode unit comprises a plurality of shared logic units that are used to determine either the cross product or the dot product, as indicated by the signal. These logic units are “shared” in the sense that they are used in both the cross product determination and the dot product determination. In this manner, because resources are shared for generating cross products and dot products, the device significantly reduces the cost of implementing both dot product units and cross

product units (see e.g., application, as originally filed, at page 6, lines 17-19 and page 14, lines 5-9).

None of the prior art teaches or suggests shared logic units for generating cross products and dot products. King teaches a system for computing a dot product but does not mention or suggest the need to calculate cross products, and Wang teaches a system for computing a cross product but does not mention or suggest the need to calculate dot products. Although Applicant maintains that there is no motivation to combine King and Wang (for reasons set forth in an earlier Amendment), Applicant submits that even if King and Wang were combined, there is no teaching or suggestion of shared logic units that are used to generate the cross product and the dot product, as required by the claims.

Applicant does not dispute that presently, use of both dot product and cross products in 3D graphics have become more common; however, at the time of Applicant's invention, the use of shared logic units for determining cross products and dot products was unknown. Thus, the rejection for alleged obviousness in view of the Wang and King references is improper and should be withdrawn.

Independent claims 11 and 18 include features similar to those described above with respect to claim 1. Based on the foregoing, claims 1, 11, and 18, and those claims dependent therefrom, including claims 6-9 and 17, should not be rejected as being unpatentable over King in view of Wang, taken alone or in combination. Thus, claims 1, 6-9, 11, 17, and 18 are patentable for the reasons set forth above. Withdrawal of the rejections of claims 1, 6-9, 11, 17, and 18 under 35 U.S.C. §103(a) is respectfully requested.

Rejection of claims 4, 5, 10, 12-16, 19, and 20 under 35 U.S.C. § 103(a)

Claims 4, 5, 10, 12-16, 19 and 20 have been rejected under 35 U.S.C. §103(a) as being unpatentable over King in view of Wang and Foley. Claims 4, 5, and 10 are dependent on claim 1, claims 12-16 are dependent on claim 11, and claims 19 and 20 are dependent on claim 18, and are patentable for at least the reasons set forth above. Foley fails to cure the deficiencies of King and Wang. Although Foley describes the use of a surface normal in determining diffuse illumination, there is no teaching or

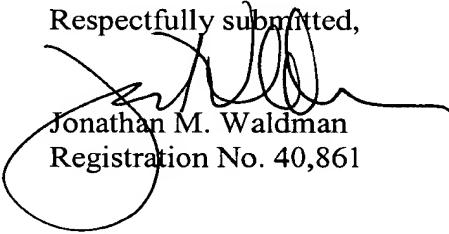
suggestion anywhere in Foley to generate a cross product or a dot product using shared logic units, as required by the claims.

Therefore, withdrawal of the rejection of claims 4, 5, 10, 12-16, 19, and 20 under 35 U.S.C. §103(a) is respectfully requested.

In view of the above amendments and remarks, Applicants respectfully submit that the present application is in condition for allowance. Reconsideration of the application and an early Notice of Allowance are respectfully requested.

Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE**IN THE CLAIMS:**

Claims 1, 11, and 18 have been amended as follows.

1. (Once Amended) A dual mode device for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product component or a dot product in response to a first signal, the first signal indicating whether to generate a cross product component or a dot product; and

a dual mode unit coupled to receive the selected vector components for generating the cross product component or the dot product in response to the first signal and comprising a plurality of shared logic units that are used to generate the cross product component and the dot product.

11. (Once Amended) A dual mode device for generating a cross product or a dot product from a first vector and a second vector, the first and second vectors having a plurality of components, the device comprising:

a dual mode controller receiving the first and second vectors, the dual mode controller being configured to select vector components for evaluating a cross product or a dot product in response to a first signal, the first signal indicating whether to generate a cross product or a dot product; and

a plurality of dual mode units coupled to receive the selected vector components for generating the cross product or the dot product in response to the first signal, each dual mode unit generating one cross product vector component of the cross product, the dual mode units generating and outputting the cross product vector components as the cross product when the select signal indicates generation of the cross product component, each dual mode unit comprising a plurality of shared logic units that are used to generate the associated cross product component and the dot product.

18. (As Amended) In computer system having a graphics subsystem comprising a dual mode device, the dual mode device comprising a dual mode controller and a dual mode unit, a method for generating a cross product or a dot product from a first vector and a second vector, the first vector having a first set of components and the second vector having a second set of components, the method comprising:

- receiving the first and second vectors for generating a cross product component or a dot product at the dual mode controller;

- receiving a first signal indicating whether to generate a cross product component or a dot product at the dual mode controller;

- selecting vector components for evaluating the cross product component or the dot product in response to the first signal;

- sending the selected vector components to the dual mode unit; and

- in response to the first signal and the selected vector components, generating the cross product component when the first signal indicates generation of the cross product component and generating the dot product when the first signal indicates generation of the dot product, wherein the generating of the cross product component and the dot product is performed using a plurality of shared logic units.